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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/559,152	04/26/2006	Holger Dziallas	034166.006US	9050
25461 7590 04/28/2008 SMITH, GAMBRELL & RUSSELL SUITE 3100, PROMENADE II 1230 PEACHTREE STREET, N.E. ATLANTA, GA 30309-3592				
EXAMINER CHUANG, ALEXANDER				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/559,152

**Applicant(s)**

DZIALLAS ET AL.

**Examiner**

ALEXANDER CHUANG

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 6 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 8 and 9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 10-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/5508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office Action addresses claims 1-7 and 10-13 in which:
  - a. Claims 8 and 9 are canceled.
  - b. Claims 10-13 are added.
2. Rejections under title 35 USC 101 and 112 are withdrawn in view of the amendment (cancellation of claim 9).
3. Claims 1-7 and 10-13 remain rejected under 35 USC 102 and 103(a) for the reasons of record. Accordingly, this action is made final.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claim 1, 2, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Acker et al (US 2002/0102451).

Acker et al taught a MEA (membrane electrode assembly) comprised of an anode gas diffusion layer 44, anode catalyst layer 42, a proton-conducting electrolyte (ionomer) 80, a cathode catalyst layer 46, and a cathode gas diffusion layer 48. The anode diffusion layer 44 and the anode catalyst layer 42 are in contact with the ionomer 80 on the anode side. The cathode catalyst layer 46 and the cathode gas diffusion layer 48 are in contact with the ionomer 80 on the cathode side.

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Additionally, the ionomer 80 is sandwiched between the anode catalyst layer 42 and the cathode catalyst layer 46. See figure 3 and section 46.

Section 51 states the catalytic particles are loaded onto either the substrate or the membrane electrolyte. The instant claim limitation is still anticipated since the reference teaches the catalyst loading is done on the substrate. Section 53 states the catalytic particles are loaded onto either the substrate or the membrane electrolyte. This instant claim limitation is still anticipated since the reference teaches the catalyst loading is done on the electrolyte membrane.

In regards to claim 13, Acker et al does disclose a fuel cell with all the features of the fuel cell described in claim 1.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
8. Claim 3 rejected under 35 U.S.C. 103(a) as being unpatentable over Acker et al (US 2002/0102451) in further view of Yamauchi et al (US 6,878,473 B2).

Acker et al discloses a fuel cell system using a DMFC with the same schematic as stated in claim 1; they also discloses the thickness of the anode catalyst layer which is in the range of 5 microns to 15 microns, however, they did not disclose the thickness of the cathode catalyst layer. Additionally, Acker et al mentions that it is possible to use other conductive/reactive particles to reduce the level of platinum loading which would reduce the cost of the electrode itself. See paragraph [0051]. Yamauchi disclosed using a fuel cell with a cathode catalyst layer thickness of 100  $\mu\text{m}$  (column 8, lines 35-40). Additionally, catalyst layer thickness is a result affecting variable because this layer determines how much oxidant passes through the cathode. Therefore, at the time of invention, it would have been obvious to a person having ordinary skill in the art to adjust the catalyst layer thicknesses and optimize them in such a way that the reactants would diffuse through the electrodes and energy generation within the fuel cell is maximized.

9. Claims 4, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over of Acker et al (US 2004/0185414) in view Jörissen et al (J. Power Sources 105 (2002) 267-273) and Surampudi et al (US 5599638).

Acker et al taught a membrane electrode assembly consisting of electrodes and catalyst layers as described above, however, the amount platinum-ruthenium alloy particles in the anode and platinum particles in the cathode catalyst layers are not disclosed. In Surampudi et al's work, loaded platinum-ruthenium alloy particles in the range of  $0.5\text{--}4.0 \frac{\text{mg}}{\text{cm}^2}$  in the anode catalyst layer and unsupported platinum particles in the range of  $0.5\text{--}4.0 \frac{\text{mg}}{\text{cm}^2}$  in the cathode catalyst layer. Though unsupported platinum was used in the study, Surampudi et al also disclosed the cathode metal particles are preferably mounted on a carbon support. See column 7, lines 30-65. Experimental work performed by Jörissen et al shows the current density does not improve when the anode catalyst loading is greater than  $2.1 \frac{\text{mg}}{\text{cm}^2}$ . See page 269. All three groups of inventors' works are analogous art since both are concerned with the catalysis of DMFC. It would have been obvious to a person having ordinary skill in the arts to modify the catalyst amounts taught by prior art to optimize current density.

10. Claim 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dirven et al (US 5,561,000) in view of Acker et al (US 2002/0102451 A1) and Starz et al (US 6,500,217 B1).

Dirven et al disclosed making an anode gas diffusion substrate by applying a catalyst support, the catalyst itself, and drying the electrode in an oven for one hour (see column 4). Finally, the cathode, which is made in the same way the

anode was, anode, and membrane were united by hot-pressing (column 4, lines 62-65). The reference does not disclose the cathode catalyst being applied to the ionomer membrane. Acker discloses the cathode catalyst layer is applied to either the cathode gas diffusion layer or the membrane electrolyte (section 53). Additionally, Starz et al disclosed a procedure for applying layers to a polymer electrolyte membrane. The process is capable of coating both sides of the membrane (as stated in instant claim 10); however, it is useful for coating one side of the membrane only (column 7, lines 10-12). Therefore, at the time of invention, it would have been obvious to a person having ordinary skill in the art to apply catalyst to an anode electrode and dry it, apply catalyst to the membrane, and finally hot-pressing each component together to obtain the predictable result of forming a MEA.

11. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dirven et al (US 5,561,000), Acker et al (US 2002/0102451 A1), and Starz et al (US 6,500,217 B1) as applied to claim 7 and 10 above, and further in view of Wilson (US 5234777) and Clsar et al (US 5,635,039).

Dirven et al, Acker et al, and Starz et al disclosed a MEA for a DMFC as discussed above; however, washing of the membrane was not disclosed. Clsar et al disclosed that membranes should be washed before being used to remove trace organic and inorganic contaminants (column 8, lines 33-35). Therefore, at the time of invention, it would have been obvious to wash the membrane with water in order to remove impurities from the membrane.

***Response to Arguments***

12. Applicant's arguments filed March 6<sup>th</sup>, 2008 have been fully considered but they are not persuasive.

35 U.S.C. 102(b) rejections on claims 1 and 2

Claims 1 and 2 now define a method for the production of a membrane electrode unit rather than a membrane electrode unit for direct methanol fuel cells. Since the nature of the claims is changed, Acker et al is cited for 35 U.S.C. 102(b) for both claims 1 and 2. Since the rejection is under 35 U.S.C. 102(b), the surprising results argument cannot be considered. Additionally, claim 1 seems to read on a method to produce a membrane electrode unit with the requirement that the unit “comprising an anode gas diffusion substrate, an anode catalyst layer...” rather than a method claim with sequential steps. Claim 2 also seem to read on a method of making a membrane electrode unit comprising of similar features. Therefore, Acker et al still anticipate claim 1 and 2.

35 U.S.C. 103(a) rejections on claims 3

Applicant's principle argument is that the missing elements of Acker et al are not found in Miyamoto. The secondary reference is replaced by Yamauchi et al.

***Conclusion***

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP



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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37

CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Chuang whose telephone number is (571)270-5122. The examiner can normally be reached on Monday to Thursday 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571)-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AC

Alexander Chuang  
Patent Examiner GAU 1795  
April 15, 2008

/PATRICK RYAN/  
Supervisory Patent Examiner, Art Unit 1795